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Philosophical Transactions

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and therefore I think we have sufficient Reason to conclude that their Measures were certainly taken very near the Truth.

John Ellicott.

XII. Several Papers concerning a new Semi-Metal, called Platina; communicated to the Royal Society by Mr. Wm. Watson F. R. S.

I.

Extract of a Letter from William Brownrigg M. D. F. R. S. to Wm. Watson F. R. S.

Dear Sir, Whitehaven, Dec. 5, 1750.

Read Dec. 13. 1750. **I** TAKE the Freedom to inclose to you an Account of a Semi-metal call'd *Platina di Pinto*; which, so far as I know, hath not been taken notice of by any Writer on Minerals. Mr. *Hill*, who is one of the most modern, makes no mention of it. Presuming therefore that the Subject is new, I request the Favour of you to lay this Account before the *Royal Society*; to be by them read and published, if they think it deserving those Honours. I should sooner have published this Account, but waited, in hopes of finding Leisure to make further Experiments on this Body with sulphureous and other Cements; also with Mercury, and several corrosive *Menstrua*. But these Experiments I shall now defer, until I learn how the above is receiv'd. The Experiments which I have related were several of them made by a Friend, whose Ex-

actness in performing them, and Veracity in relating them, I can rely on: However, for greater Certainty, I shall myself repeat them I am, dear Sir,

Your most obedient Servant,

W. Brownrigg.

II.

Memoirs of a Semi-metal called Platina di Pinto, found in the Spanish West Indies.

ALTHO' the History of Minerals, and other fossil Substances, hath been diligently cultivated, especially by the Moderns; yet it must be acknowledged, that, among the vast Variety of Bodies which are the Objects of that Science, there still remains Room for new Inquiries:

No Wonder that, among the great, and almost inexhaustible Varieties of Salts, Ores, and other Concretes, new Appearances, and Mixtures before unknown, should daily be discover'd: But that, among Bodies of a more simple Nature, and particularly among the metalline Tribe, several distinct Species should still remain almost wholly unknown to Naturalists, will doubtless appear more strange and extraordinary.

Gold is usually esteem'd the most ponderous of Bodies; and yet I have seen, in the Possession of the late Professor's *Gravesande*, a metalline Substance, brought from the *East Indies*, that was specifically heavier than Gold, by at least a twentieth Part. Mercury, next to Gold, is commonly said to be the heaviest Body; yet Mercury is greatly exceeded in specific Gravity
by

by a Semi-metal brought from the *West Indies*, whereof I have now the Honour to present Specimens to the *Royal Society*. And this Semi-metal seems more particularly to deserve our Attention, as it is endu'd with some very singular Qualities, which plainly demonstrate that certain general Theorems, tho' long establish'd, and universally receiv'd by the Metallurgists, yet do not hold true in all Cases, and ought not to be admitted into their Arts, without proper Limitations and Restrictions. For instance, *That Gold and Silver may be purified from all heterogeneous Substances by Cappellation*; is a Proposition that all Assayers and Refiners have long thought true and undeniable; yet this Proposition ought not to be receiv'd by those Artificers, without an Exception to the Semi-metal here treated of; since, like those nobler Metals, it resists the Power of Fire, and the destructive Force of Lead in that Operation.

This Semi-metal was first presented to me about nine Years ago, by Mr. *Charles Wood*, a skilful and inquisitive Metallurgist, who met with it in *Jamaica*, whither it had been brought from *Cartagena* in *New Spain*. And the same Gentleman hath since gratified my Curiosity, by making further Inquiries concerning this Body. It is found in considerable Quantities in the *Spanish West Indies* (in what Part I could not learn) and is there known by the Name of *Platina di Pinto*. The *Spaniards* probably call it *Platina*, from the Resemblance in Colour that it bears to Silver. It is bright and shining, and of a uniform Texture; it takes a fine Polish, and is not subject to tarnish or rust; it is extremely hard and compact; but, like Bath-metal, or cast Iron, brittle, and cannot be extended under the Hammer.

The

The *Spaniards* do not dig it in the Form of Ore, but find it in Dust, or small Grains, as herewith presented to the *Royal Society*. Whether they gather it in a pretty pure State, as brought to us, or wash it, like Gold-dust, from among Sand, and other lighter Substances, is to me unknown: However, it is seldom collected perfectly pure; since, among several Parcels of it that I have seen, I constantly observ'd a large Mixture of a shining black Sand, such as is found on the Shores of *Virginia* and *Jamaica*, which is a rich iron Ore, and answers to the Magnet. It hath also usually mix'd with it some few shining Particles of a golden Colour, which seem to be a Substance of a different Nature.

It is very probable that there is great Plenty of this Semi-metal in the *Spanish West Indies*; since Trinkets made of it are there very common. A Gentleman of *Jamaica* bought five Pounds of it at *Carthagena* for less than its Weight of Silver; and it was formerly sold for a much lower Price.

When exposed by itself to the Fire, either in Grains, or in larger Pieces, it is of extreme difficult Fusion; and hath been kept for two Hours in an Air-Furnace, in a Heat that would run down cast Iron in fifteen Minutes: Which great Heat it endur'd without being melted or wasted; neither could it be brought to fuse in this Heat, by adding to it Borax, and other saline Fluxes. But the *Spaniards* have a Way of melting it down, either alone, or by means of some Flux; and cast it into Sword-hilts, Buckles, Snuff-boxes, and other Utensils.

When exposed to a proper Degree of Fire, with Lead, Silver, Gold, Copper, or Tin, it readily melts

and incorporates with these Metals; rendering the Mixture, like itself, extremely hard and brittle.

Having been melted in an Assay-Furnace, on a Test with Lead, and therewith exposed to a great Fire for three Hours, till all the Lead was wrought off, the *Platina* was afterwards found remaining at the Bottom of the Test, without having suffer'd any Alteration or Diminution by this Operation.

A Piece of *Platina* was put into strong and pure *Aqua fortis*, and therewith placed in a Sand-heat for twelve Hours: The *Platina*, when taken out of the *Aqua fortis*, was found of the same Weight as when put into it; being in no-wise dissolved or corroded by that *Menstruum*.

It had been reported, that this Semi-metal was specifically heavier than Gold; but having weigh'd several Pieces of it hydrostatically in a nice Assay-Balance, I found one of these Pieces to weigh in Air gr. $\frac{345}{8}$, and in Water gr. $\frac{122}{8}$: So that its specific Gravity was to that of Water exactly as 15 : 1. Another Piece, that seem'd to be cast very open and porous, I found in Gravity to Water only as 13.91 to 1. Altho' this last-mention'd Piece, could it have endur'd the Hammer as well as Gold, might probably have been reduc'd to a considerably greater Degree of Solidity than that of the first-mention'd Specimen. For the purest Gold is seldom found, after Fusion, to come up to its true specific Weight, until it hath been brought up to its greatest Degree of Solidity under the Hammer.

I also weigh'd an equal Mixture of Gold and *Platina*, which I found nearly as ponderous as Gold itself; the specific Weight of this Mixture being to that of Water as 19 to 1.

It hath been reported, that the *Spaniards* have sometimes been tempted to adulterate Gold with *Platina*, as the Mixture could not be distinguish'd from true Gold by all the ordinary Trials: But the Gold thus adulterated was, upon a nicer Examination, found hard and brittle, and could not be separated from the *Platina*, and render'd ductile and pure, either by Cementation, or by the more ordinary Operations with Lead and Antimony. In order therefore to prevent this Fraud, the King of *Spain* commanded that the Mines of *Platina* should be stopped up; so that this Semi-metal is now much scarcer than formerly.

From the foregoing Account it appears, that no known Body approaches nearer to the Nature of Gold, in its most essential Properties of Fixedness and Solidity, than the Semi-metal here treated of; and that it also bears a great Resemblance to Gold in other Particulars. Some Alchemists have thought that Gold differ'd from other Metals in nothing so much as in its specific Gravity; and that, if they could obtain a Body that had the specific Weight of Gold, they could easily give it all the other Qualities of that Metal. Let them try their Art on this Body; which, if it can be made as ductile as Gold, will not easily be distinguish'd from Gold itself.

Upon the whole, this Semi metal seems a very singular Body, that merits an exacter Inquiry into its Nature than hath hitherto been made; since it is not altogether improbable, that, like the Magnet, Iron, Antimony, Mercury, and other metallic Substances, it may be endowed with some peculiar Qual-

lities, that may render it of singular Use and Importance to Mankind.

Specimens of Platina presented to the Royal Society.

- Nº. 1. *Platina*, in Dust, or minute Masses, mixed with black Sand, and other Impuritics, as brought from the *Spanish West Indies*.
2. Native *Platina*, separated from the above-mention'd Impurities.
3. *Platina* that has been fused.
4. Another Picce of *Platina*, that was Part of the Pummel of a Sword.

III.

To the Royal Society.

Gentlemen,

London, Dec. 13, 1750.

I BEG Leave to subjoin a few Lines to my learned and ingenious Friend Dr. Brownrigg's Paper concerning the *Platina di Pinto*, or what is likewise call'd in *America Juan Blanco*. This Substance is mention'd in no Author I have met with, except by our worthy Brother Don *Antonio d'Ulloa*, who, in the History of his Voyage to *South America*, Vol. II. Book 6. Chap. 10. which I have here extracted, and translated from the *Spanish*, when giving an Account of the Gold and Silver Mines in the Province of *Quito*, and of the various Methods of separating these Metals from other Substances, with which they are combin'd, says, that, " in the Territory of " *Choco* . . . there are Gold Mines, in which that " Metal

“ Metal is so disguised and enveloped with other
 “ mineral Substances, Juices, and Stones, that, for
 “ their Separation from the Gold, they are obliged
 “ to use Quicksilver. Sometimes they find mineral
 “ Substances, which, from their being mixed with
 “ *Platina*, they chuse to neglect. This *Platina*
 “ is a Stone (*Piedra*) of such Resistance, that it
 “ is not easily broken by a Blow upon an Anvil.
 “ It is not subdued by Calcination; and it is very
 “ difficult to extract the Metal it contains even with
 “ much Labour and Expence.”

In the before-mention'd Work, *Chap. II.* the same Author, when speaking of the remaining Works of the *Indians* of old, says, “ the *Specula* wrought “ out of Stones, which are found in the Places of “ Worship of the *Indians*, are of two kinds, in re- “ lation to the Matter of which they are made: “ One of these is call'd *Piedra de Inga*, the other “ *Piedra de Gallinazo*. The first of these is smooth, “ of a leaden Colour, and not transparent; they are “ usually found wrought of a circular Figure: One “ of the Surfaces is plain, and as smooth as though “ it were made of a kind of Chrystal; the other Sur- “ face is oval, or rather somewhat spherical, and not “ so much burnish'd as the plain one. Although they “ vary in their Size, they are commonly from three “ to four Inches in Diameter; but he has seen one “ that was a Foot and half in Diameter. Its prin- “ cipal Surface was concave, and much augmented “ the Size of Objects, as its Polish was in as great “ Perfection as though it had been work'd by a dex- “ trous Artist in these Times.

“ This

" This Stone has certain Veins, or hair-like Appearances, on its Surface; whereby it is render'd less fit for a *Speculum*, and is apt to break in these Veins in receiving any Blow. Many are persuaded, or at least suspect, that the Matter of these is a cast Composition; and although there are some Appearances of this being so, they are not sufficiently convincing. In this Country there are Gullies (*Quebradas*) where the Mineral of them is found rough, and from whence some are always taken; but these are not now wrought for those Purposes for which heretofore they were employ'd by the *Indians*: But this is no Reason but that some of them may have been cast, as with the same Material taken out of the Mine, they may have been made artificially, and thereby have receiv'd a greater Degree of Perfection, as well in their Quality as in their Figure." He says further, " that, although at present, these, as well as several other things found there are but of small Value, nevertheless they are extremely curious, and worthy to be esteem'd, as well for their great Antiquity, as for their being the Performances of those barbarous People."

Some of these *Piedras de Inga* I now take the Liberty of laying before the *Society*, both in their rough and in their polish'd State. They were brought hither with several other Curiosities from *America*, by that excellent Person, and my much-lamented Friend, Don *Pedro Maldonado*, and were presented by him to our most worthy *President*, who was pleased to put them into my Hands. They are doubtless of a metalline Substance, and have, in
my

my Opinion, evident Marks of having been fused and cast. They very much resemble, as you will see by comparing them, the *Platina* before-mention'd: And though they are call'd (*Piedras*) Stones by Don *Antonio d'Ulloa*, he likewise gives the same Appellation to the *Platina*. I cannot therefore help recommending to some curious Metallurgist of the *Society* to make the Experiment, whether or no, when the *Piedras de Inga* are, by a proper Process, divested of their stony and other heterogeneous Parts, the metalline *Refiduum* will not resemble, as well in specific Gravity (for which it is so remarkable) as in other Properties, the purified *Platina* now before us?

Wm. Watson.

IV.

*Read Dec. 20.
1750.* IN January 1742-3. there were brought from *Jamaica*, in a Man of War, several Bars (as thought) of Gold, consigned from different Merchants of that Island, to their different Correspondents here, as Bars of Gold. These Bars had the same specific Gravity, or rather more than Gold, and were exactly like that Metal in Colour, Grain, &c. A Piece of one of these counterfeit Bars was sent to the Mint to be tested, and it was found to be twenty-one Carats three Grains worse than Standard.

Emanuel Mendez da Costa.

*Extract of a Letter from Wm. Brownrigg M. D.
and F. R. S. to Wm. Watson F. R. S. contain-
ing some further Experiments upon the Platina.*

Whitehaven, Feb. 13, 1750.

Read Feb. 28. *I* WAS favour'd with your Letter of 1750-51. *I* Dec. 15, and am much obliged to you for the Trouble you took in presenting my Specimens of the *Platina* to the *Royal Society*, together with my Memoir relating thereto; and I thank you for the Addition you made to it of the Extract of Don *d'Ulloa's Voyage*.

The Gentleman, whose Experiments on *Platina* I mention'd to the *Royal Society*, was Mr. *Charles Wood*, who permitted me to make what Use of them I pleased; and I did not pretend to have made any new Discovery, nor to know so much of that Body, as hath long been known to the *Spaniards*. I might indeed have made use of his Authority; but he was not ambitious of appearing in Print.

The chief thing about which I had any Difficu'ty, was what had been asserted of the *Platina's* resisting the Force of Lead in Coppellation. This Experiment I have tried therefore, by adding to gr. *xxvi.* of *Platina*, sixteen times its Weight of pure Lead, that I had myself reduced from Litharge. To the Lead put into a Coppel, and placed in a proper Furnace; as soon as it was melted I added the *Platina*, which in a short time was dissolved in the Lead. After the Lead was all wrought off, there remain'd at the Bottom of the Coppel a Pellet of *Platina*, which I found to weigh only gr. *xxi.*; so that, in
this

this Operation, the *Platina* had lost near a fifth Part of its Weight.

According therefore to this Experiment, the *Platina* does not wholly resist the Force of Lead in Coppellation ; but, by repeated Operations of that kind with larger Quantities of Lead, may probably all be destroy'd : And by such repeated Coppellations, Gold and Silver may very likely be refin'd from it ; although what was before asserted may hold pretty true, with regard to the common Coppellations of the Assayers and Refiners.

Mr. *Wood* said, that, in his Experiment, he thought the *Platina* rather gain'd than lost in Weight by Coppellation. This might happen from some small Mixture of Lead, or other Metal continuing with it after it remained no longer fused.

From this single Experiment I will not be quite positive that Lead thus consumes some small Quantity of *Platina*, since it is possible the *Platina* used might not be pure. Besides, in order to keep it longer in Fusion, I urged on the Experiment with an uncommon Degree of Heat, especially towards the End of the Operation ; although I think no great Error could thence arise ; as half a Drachm of Silver, which I coppel'd at the same time, had lost only two Grains in the Operation.

I am told that one Mr. *Ord*, formerly a Factor to the *South Sea Company*, took in Payment from some *Spaniards* Gold, to the Value of 500*l.* Sterling, which being mix'd with *Platina*, was so brittle, that he could not dispose of it, neither could he get it refin'd in *London*, so that it was quite useless to him : Altho', if no Error hath been com-

mitted in the above-mention'd Experiments, it might probably have been render'd pure by a much larger Dose of Lead than is usually applied for that Purpose.

To my Memoir I might have added, that, attempting to cleanse a Parcel of the native *Platina* from the black Sand, wherewith it was mixed, I found that a great many of its Grains were attracted by the Magnet I made use of for that Purpose. This Circumstance I took notice of in a Letter to Lord *Lonsdale* two Years ago. I am,

Dear Sir,

Your most obliged humble Servant,

W. Brownrigg.

XIII. *An Account of a very large human Calculus, by Wm. Heberden M. D. F. R. S. and Fellow of the Coll. of Physic. Lond.*

*Read Dec. 20.
1750.* **T**HERE is preserved in the Library of *Trinity-College* in *Cambridge*, a Stone taken from a human Bladder, which, for its uncommon Size, may deserve the Notice of his, *Society*. It is of an oval Shape, flattened on one Side and its Surface is smooth. The specific Gravity plainly shews, that it is of an animal Origin; for its Weight is to that of Water only as 1,75 to 1.

In order to get a true and well-attested History of this curious Stone, the Right Rev. Dr. *Claggett*, late Bishop of *Exeter*, was applied to, who was Keeper